

First Name	
Last Name	
Date	
Total Marks	/ 100 marks

MathsMadeEasy

GCSE Mathematics
Non-Calculator
Higher Tier
Free Practice Set 3
1 hour 45 minutes



Answers at:

<http://www.mathsmadeeasy.co.uk/gcsemathspapers-free.htm>

Instructions

Write your name and other details in the boxes above.

Answer all the questions

Take π to be 3.142

Information

Marks are shown in brackets for each question (2)

Calculators may not be used

Advice

Don't spend too long on one question

Show all your working in calculations for full marks

You will get marks for method even if your answer is incorrect

Leave a question until later if you cannot answer it

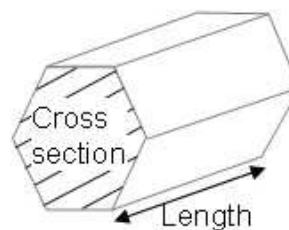
Materials needed for examination

Ruler marked in centimetres and millimetres,
protractor, compasses, pen, pencil, rubber
Tracing paper may be used

Dedicated to my Mother-in Law, Kath (1915-2008)

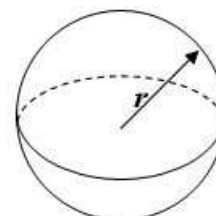
Formulae sheet — Higher tier

Volume of prism = area of cross-section \times length



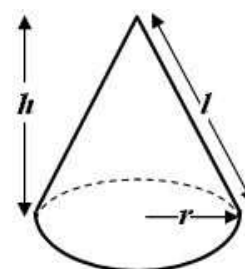
Volume of sphere = $\frac{4}{3} \pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3} \pi r^2 h$

Curved surface area of cone = $\pi r l$

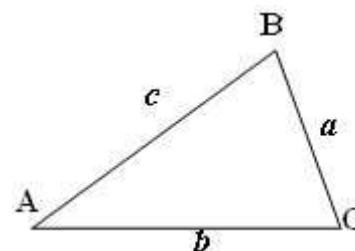


In any triangle ABC

Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of a triangle = $\frac{1}{2} ab \sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Authors Note

Every possible effort has been made to ensure that everything in this paper is accurate and the author cannot accept responsibility for any errors.

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Question	Type of question	Marks
1	Number operations, Estimation	6
2	Formula substitution	4
3	Fractions	4
4	Calculations, percentages, VAT	6
5	Algebra – expression, equation, factorise	13
6	Translation, Reflection	2
7	Angles	4
8	Pie Chart and stem & leaf	6
9	Line equations	3
10	Cumulative Frequency	4
11	Plotting x^2 graph	4
12	Constructing bisector	2
13	Similar triangles, surface areas	6
14	Negative scale factor	3
15	Probability	4
16	Subject of Formula	3
17	Recurring decimal to fraction	2
18	Complete square	5
19	Inverse Proportionality	4
20	Standard form	4
21	Vectors	4
22	Surds	4
23	Transforming graphs	3

Answer ALL questions.

Write your answers in the spaces provided.
Do NOT use a Calculator

You must write down all stages in your working.

1. What is

a) $8 \times 6 - 4 \div 2$

.....
(1)

b) $\frac{18 \times 7}{3 \times 4}$

.....
(1)

c) Estimate

$$\frac{14.9 \times 99}{0.52}$$

.....
(3)

d) $243 \div 9$

.....
(1)

2. The formula $v^2 = u^2 + 2as$ gives the final velocity of an object

a) Find the value of v when $u = 6$, $a = 8$ and $s = 4$

.....
(2)

b) If $v = 12$, $u = 8$ and $a = 8$ find s

.....
(2)

3. What is:

a) $3\frac{1}{3} + 2\frac{4}{5}$

.....
(2)

b) $1\frac{2}{3} \times 2\frac{3}{5}$

.....
(2)

4. Matthew bought some mp3 downloads
Each download costs 60 pence each
He spent £7.20.

a) How many downloads did he buy?

.....
(2)

b) Matthew found he could get 25% off the £7.20 he paid for his downloads.
How much would he pay with the 25% off?

£.....
(2)

c) Matthew bought an iPod-touch for £210
VAT on the iPod-touch is 15 %

How much does the iPod-touch cost including VAT?

£.....
(2)

5. a) Simplify:

$$8y \times 3y^2$$

.....
(1)

b) Solve
 $6x - 14 = 10$

x =
(1)

c) Expand and simplify:
 $3(x + 4y) + 2(5x - 3y)$

.....
(2)

d) Solve
 $9(x + 2) = 7x + 23$

x =
(2)

- e) $-3 < x \leq 2$
What are the possible values for x ?

$x = \dots\dots\dots$ (2)

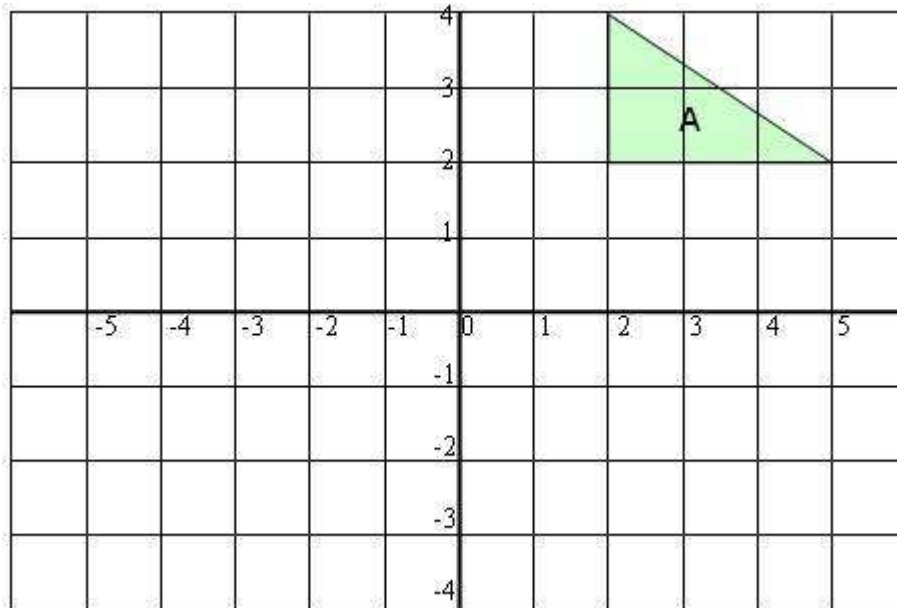
- f) Factorise $4y^2 - 16$

$\dots\dots\dots$ (1)

- g) Simplify $\frac{2x^2 - 7x + 3}{x^2 + x - 12}$

$\dots\dots\dots$ (4)

6.



Triangle A is shown above.

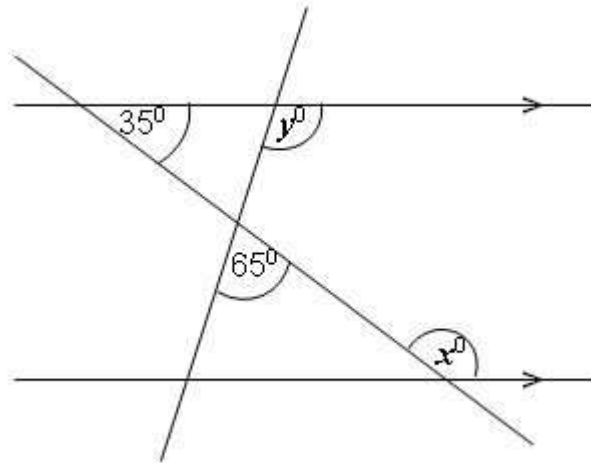
a) Translate the triangle A by $\begin{pmatrix} -6 \\ -5 \end{pmatrix}$ Label the new triangle B

(1)

b) Reflect the triangle B in the y-axis
Label the triangle C

(1)

7. The diagram shows two parallel lines and two other lines which intersect



a) Work out the size of angle x

$$x = \dots\dots\dots^\circ$$

(1)

b) Explain how you got your answer

..... **(1)**

c) Work out the size of angle y

$$y = \dots\dots\dots^\circ$$

(1)

d) Explain how you got your answer

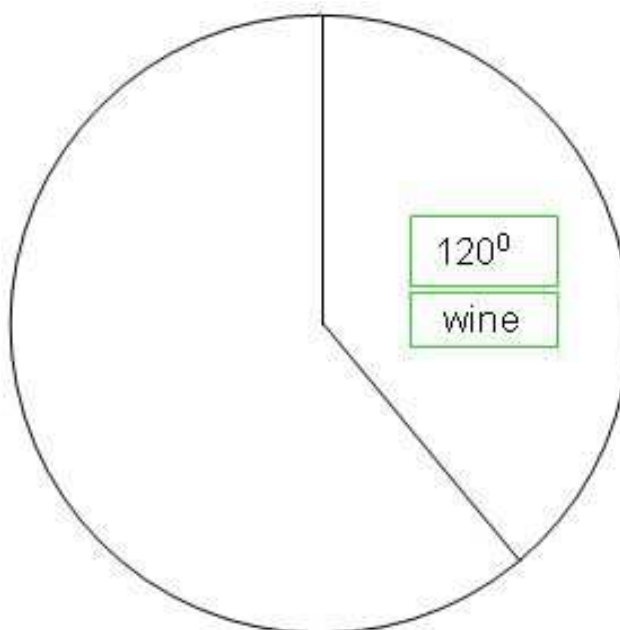
..... **(1)**

8. A shop recorded the types of drinks bought by 90 customers for Christmas

Drink	Frequency	angle
Wine	30	120
Beer	35	
Spirits		40
Champagne	15	

a) Complete the table above (2)

b) Draw an accurate pie chart to show this information. The first drink has been done for you.



(2)

- c) Hosanna counted the number of sweets in 30 sweet packets. She got the following results.

14	18	25	26	33	43	28	12
41	42	48	27	38	45	23	13
8	11	14	20	43	19	33	
32	32	36	36	8	9	27	

Draw a stem and leaf diagram to show these results with this Key: $4 \mid 1 = 41$

(2)

9. a) What is the gradient of the straight line equation $y = 4x + 6$

.....
(1)

- b) What is the gradient of the *perpendicular* line to $y = 4x + 6$

.....
(1)

- c) What are the co-ordinates of point P where $y = 4x + 6$ cuts the **x-axis**

(.....,)
(1)

10. A survey of 40 children was made to see how long they spent revising for their GCSE Maths exam in the month before the exam.

The table below shows how long in hours the children spent.

Time (t hours)	Frequency
$0 \leq t < 4$	2
$4 \leq t < 8$	6
$8 \leq t < 12$	18
$12 \leq t < 16$	9
$16 \leq t < 20$	4
$20 \leq t < 24$	1

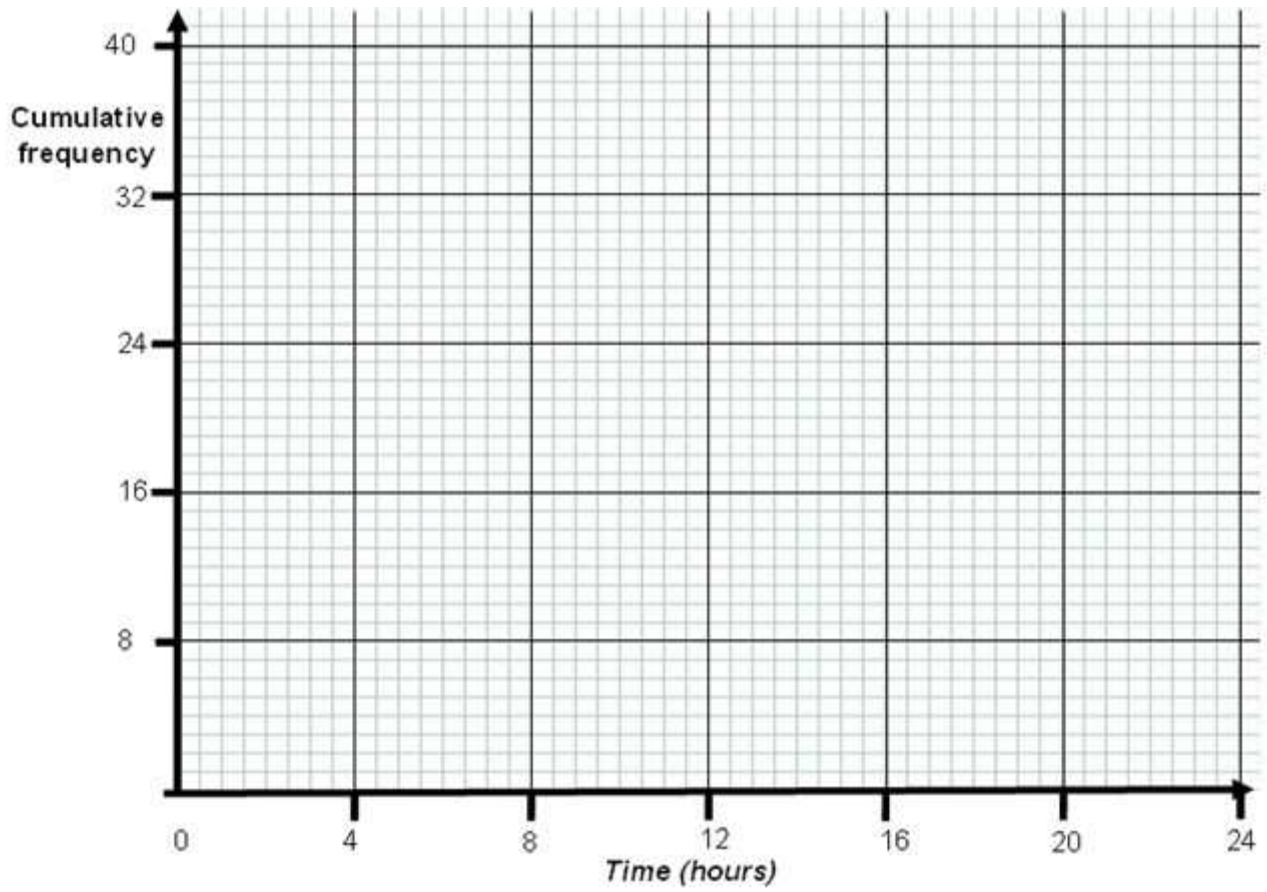
- a) Complete the cumulative frequency table

(1)

Time (t hours)	Cumulative Frequency
$0 \leq t < 4$	2
$0 \leq t < 8$	
$0 \leq t < 12$	
$0 \leq t < 16$	
$0 \leq t < 20$	
$0 \leq t < 24$	

- b) Using your completed table draw a cumulative frequency graph on the grid

(2)



c) Using the completed graph estimate the median time

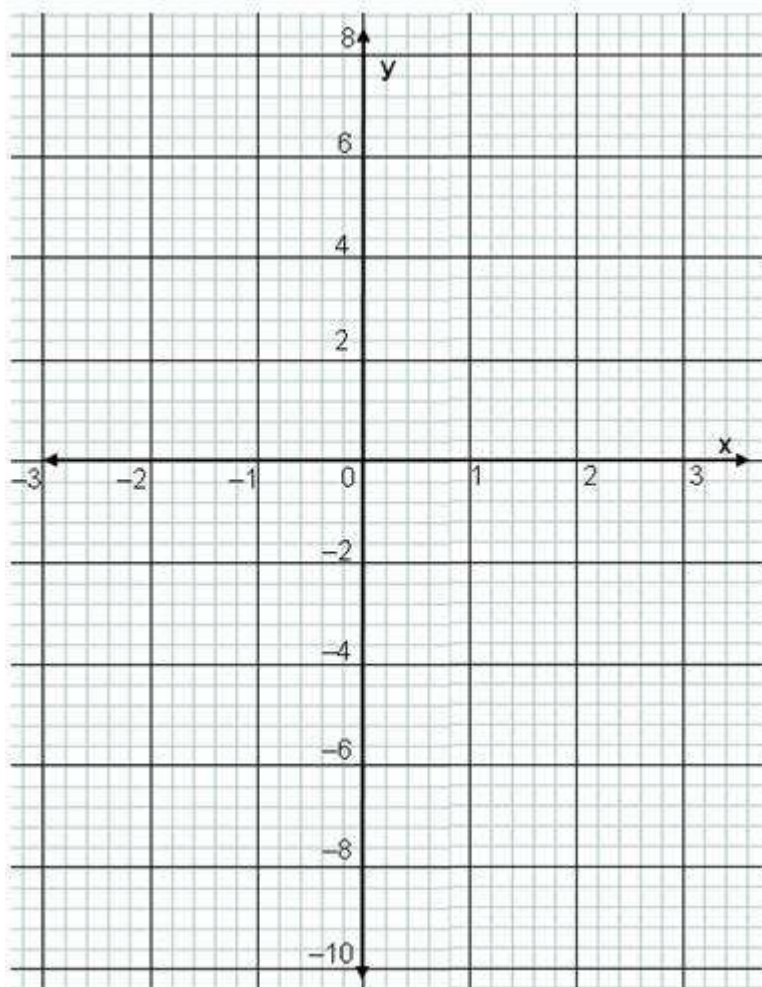
.....
(1)

11. a) Complete the table of values for $y = -2x^2 + 8$ below.
Some of the working out has been done for you

x	-3	-2	-1	0	1	2	3
$-2x^2$	-2×9						
+8	+8						
= y	-10						

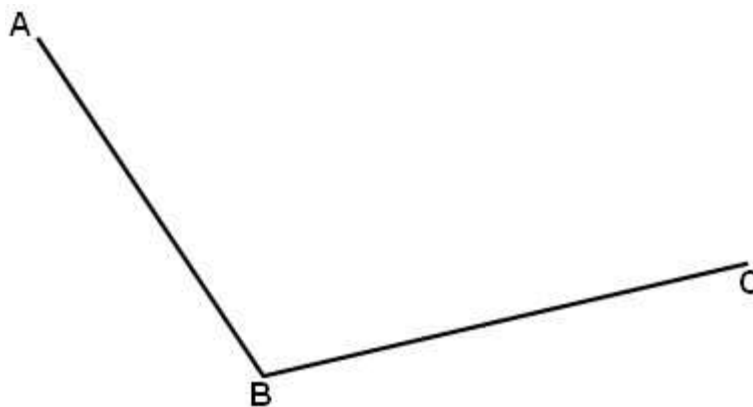
(2)

- b) Plot the graph for $y = -2x^2 + 8$



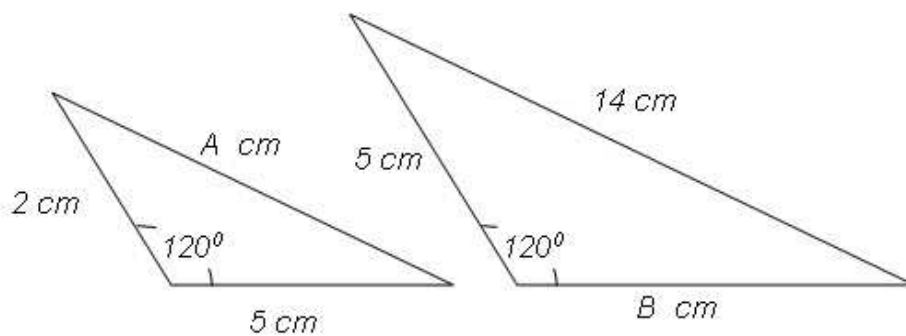
(2)

12. Construct a bisector of the angle ABC using a ruler and compasses.
Show all your construction lines



(2)

13.



Diagrams NOT drawn accurately

The two triangles are mathematically similar.

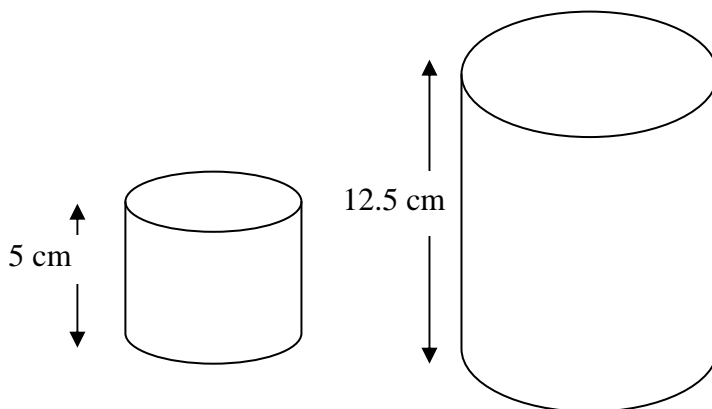
a) What is the length of side B in the larger triangle

.....cm
(2)

b) What is the length of side A in the smaller triangle

.....cm
(1)

c) Two mathematically similar cylinders are shown



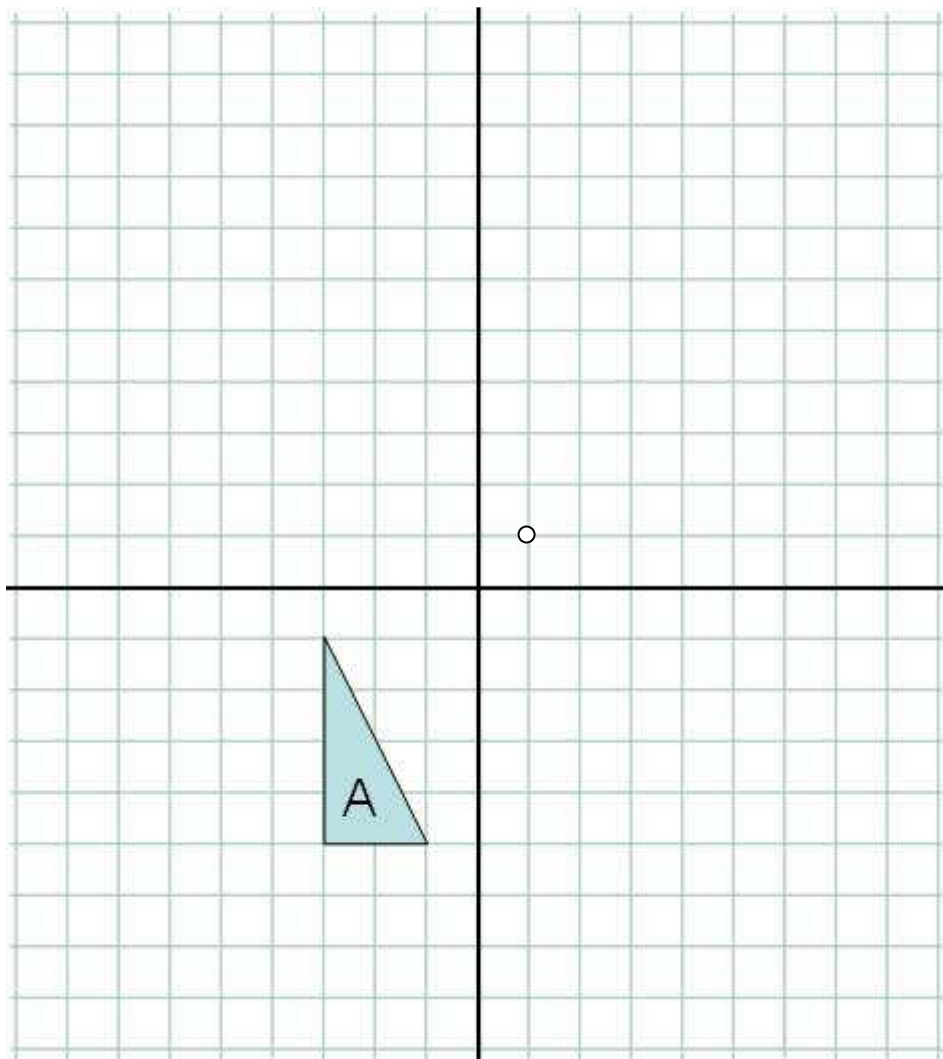
Diagrams NOT drawn accurately

The surface area of the smaller cylinder is 40 cm^2
Calculate the surface area of the larger cylinder.

..... cm^2
(3)

14. Enlarge the triangle A using a scale factor of $-1\frac{1}{2}$, centre $(1, 1)$.
Label it B

(3)



15. Sylvia played a game of dominoes and then a game of darts.

The probability that she will win the game of dominoes is $\frac{4}{7}$

The probability that she will win the game of darts is $\frac{3}{8}$

Assume that she only won or lost

a) Draw a probability tree to show this information

b) What is the probability that Sylvia will lose one game

(2)

.....
(2)

16. Make x the subject of the formula $y = \frac{3x - 4}{2ax - 3}$

.....
(3)

17. What is $0.\overline{144}$ as a fraction in its simplest form

..... (2)

18. a) Factorise $y^2 - 14y + 25$ by completing the square.

.....
(3)

b) Hence solve $y^2 - 14y + 25 = 0$. Give your answer in the form $a \pm b\sqrt{6}$.

$y =$
(2)

19. The gravitational force F (Newtons) between two masses is inversely proportional to the square of the distance d between them.

When $d = 3$, $F = 15$

- a) Find a formula for F in terms of d .

.....
(3)

- b) Hence or otherwise calculate F when $d = 5$

.....
(1)

20. a) Write 7×10^4 as an **ordinary number**

.....
(1)

- b) Write 0.0096 in **standard form**

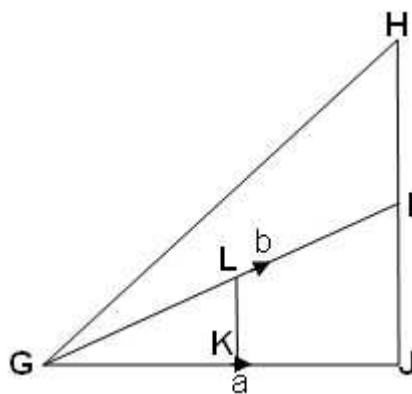
.....
(1)

- c) Work out $(7 \times 10^4)^2$

Give your answer in **standard form**.

.....
(2)

21.



$\vec{GJ} = \mathbf{a}$ $\vec{GI} = \mathbf{b}$ and $\vec{JI} = \vec{IH}$

a) Find the vector \vec{JI}

.....
(1)

b) Find the vector \vec{GH}

.....
(1)

K is the mid point of GJ and L is the mid point of GI

c) Prove \vec{KL} is parallel to \vec{JI}

.....
(2)

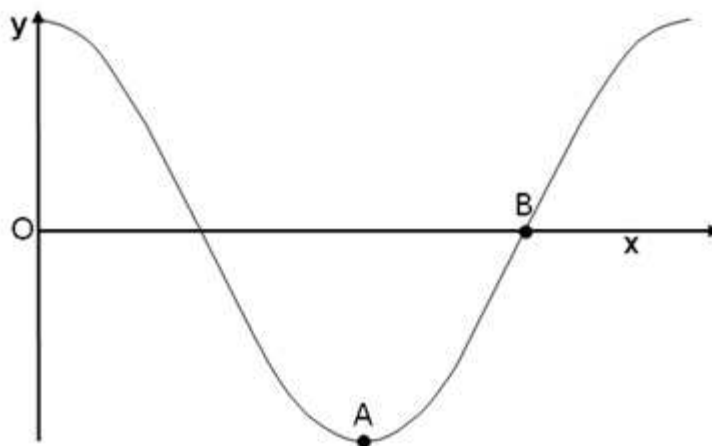
22. a) Rationalise the denominator and simplify $\frac{18}{\sqrt{6}}$

.....
(2)

b) Prove that $(\sqrt{8} + \sqrt{7})^2 = 15 + 4\sqrt{14}$

.....
(2)

23. The graph of $y = \cos(3x)^0$ is shown for values from $x = 0^0$ to 360^0



It cuts the x-axis at B with a minimum at A. What are:

- a) the co-ordinates of A

(.....,)
(1)

- b) the co-ordinates of B

(.....,)
(1)

- c) Sketch the graph of $y = \cos(3x) - 1$ on the diagram above

(1)

TOTAL FOR PAPER: 100 MARKS
END